

## Conjunctivitis in Makkah region, Saudi Arabia: A school and university level of knowledge experience

### To Cite:

Elhams YM, Bakry SMT, Almousa AA, Albagami SN, Fakieha AY, Alzahrani AS, Alsubhi AA. Conjunctivitis in Makkah region, Saudi Arabia: A school and university level of knowledge experience. Medical Science, 2022, 26, ms120e2167.

doi: <https://doi.org/10.54905/disssi/v26i122/ms120e2167>

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### Peer-Review History

Received: 12 March 2022

Reviewed & Revised: 13/March/2022 to 26/March/2022

Accepted: 27 March 2022

Published: 06 April 2022

### Peer-review Method

External peer-review was done through double-blind method.

URL: <https://www.discoveryjournals.org/medicalscience>



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### ABSTRACT

**Background:** Conjunctivitis is an epidemic disease with a self-limiting and short-lasting course with varieties of causes inflecting the prevalence and the way of spread. This study surveyed school and Umm Al-Qura University students in the western region of Saudi Arabia. **Methods:** A survey-based study was conducted between October 2021 and January 2022, including high school students in Makkah region and Umm Al-Qura University students of both genders. The study compared the awareness and knowledge of conjunctivitis and discussed the informational similarities and contradictions between the educational levels. **Results:** The participant's number in this study was 367. Students with less than 20 years old predominantly represented 60.8%, compared with 20 years old or more with 39.2%. The majority were female with 50.7%, and 49.3% for males. Most of them were Saudis 88.0%. The highest respondents were school students, while university students were the least with 41.4%. Most students were single. Moreover, the correlation between students' age and educational level were significantly positive (p-values: 0.000, 0.000 respectively). **Conclusion:** Educational programs are vital to enhancing students' recognition to control conjunctivitis spreading among communities. The current finding shows a poor level of knowledge towards conjunctivitis basic knowledge. Consequently, we recommend further studies among universities and schools.

**Keywords:** Conjunctivitis, School students, University students, Knowledge, Saudi Arabia

### 1. INTRODUCTION

Conjunctivitis is a community-acquired ubiquitous infectious disease with an epidemic impending (Prabhu et al., 2015). Inflammation and swelling are characteristic symptoms that occur to the conjunctival tissue, alongside ocular

discharge, pain, and engorgement of the blood vessels (Azari & Arabi, 2020; Shekhawat et al., 2017). Therefore, limiting the disease crucially occur through spread prevention (Prabhu et al., 2015). It's a self-limiting disease. However, the related symptoms could impair the quality of life such as ocular disturbance and functional impairment despite its being a short-lasting disease (Prabhu et al., 2015). Infrequently, sequelae like keratitis, uveitis, retinitis, optic neuritis, and extra-ocular muscle palsy can complicate the scenario (Prabhu et al., 2015). Conjunctivitis is affecting numerous subjects worldwide, and the foremost contribute to general and ophthalmologists' healthcare consultation (Azari & Arabi, 2020; Shekhawat et al., 2017). 80% of all of the most acute cases were diagnosed by non-ophthalmologists (Azari & Arabi, 2020; Shekhawat et al., 2017).

Conjunctivitis can be divided into infectious and non-infectious causes; the most widespread contagious causes are viruses and bacteria. Further, the non-infectious conjunctivitis includes allergic, toxic, and cicatricial conjunctivitis, as well as inflammation secondary to immune-mediated diseases and neoplastic processes (Azari & Barney, 2013; American Academy of Ophthalmology, 2011). Conjunctivitis is spreading in many methods, depending on the causative cause, that may predispose through the individual age and the year's season (Azari & Barney, 2013).

Viral conjunctivitis is considered the commonest cause in children and adults (Azari & Barney, 2013; Hørven, 1993; Stenson et al., 1982; Rönnerstam et al., 1985; Harding et al., 1987; Uchio et al., 2000; Woodland et al., 1992; Fitch et al., 1989), and it peaks in the summer (Høvdig, 2008). Contaminated contact, fomites, and aerosols are all considered rote carriers (Prabhu et al., 2015). Furthermore, most treatments are symptomatic and supportive, with excellent cleanliness being the most effective method for disease spread prevention (Prabhu et al., 2015). Bacterial conjunctivitis is the second most prevalent cause (Azari & Barney, 2013; Hørven, 1993; Rönnerstam et al., 1985; Woodland et al., 1992; Fitch et al., 1989) and accounts for the majority 50-75 % of cases in children (Høvdig, 2008). It is more familiar from December to April (Høvdig, 2008). Finally, the foremost common cause amongst all is allergic conjunctivitis, which impacts 15–40% of the populace (Bielory et al., 2012), and it is more prevalent in the spring and summer (Høvdig, 2008).

Many researchers have intensively studied conjunctivitis regarding its knowledge and awareness in many cities and countries nationally (Ur Parrey et al., 2019; Zarea, 2016; Alhemaiddi et al., 2017; Ragheb et al., 2019) and internationally (Khan et al., 2018; Bhat et al., 2014; Tuladhar & Gurung, 2020). However, these studies need further investigation and analysis in Makkah region, Saudi Arabia.

## 2. METHODOLOGY

This is a cross-sectional descriptive study conducted as survey-based. The study was conducted between October 2021 and January 2022 after granting ethical approval from the UQU's research ethics committee with IRB number: HAPO-02-K-012-2021-11-820.

The inclusion criteria comprised both male and female participants from high school students in Makkah region and Umm Al-Qura University students. As a beginning, we gathered all high schools names in the Makkah region according to the Makkah region's ministry of education website and categorized into seven groups: East, West, South, North, Central, Bahrah, and Al-Jamome regions. Then, schools were listed alphabetically. After that, by using the website (Random.org), we choose two schools at random from each region. The university students were randomly selected in Umm Al-Qura University based on their college.

In both English and Arabic, a questionnaire was distributed to students. The questionnaire was subsequently sent to students using the Google platform online. The newest version was provided. There were two parts to the questionnaire; we began by collecting educational and demographic data from students including age, gender, nationality, and marital status. Thereafter, we collected general conjunctivitis information to assess students' knowledge and awareness relays from previous studies (Prabhu et al., 2015; Khan et al., 2018; Bhat et al., 2014). We calculated knowledge score according to modified bloom's criteria (Seid & Hussien, 2018). Thus, the final score were categories into good, moderate, and poor level of knowledge. Between October 2021 and January 2022, students were given the questionnaire after stratification into classes is chosen randomly.

The researchers were on hand to answer any questions participants had regarding the questionnaire. Participants were asked to give their consent online before answering the questionnaire, and they completed so voluntarily. Students who agreed to participate in the study were included, while those who did not agree were excluded. We firstly input our data into MS excel sheet for data checking. Then, it was transformed into SPSS v.22, which used to analyze data, standard deviation, and significance utilizing the Chi-square test. A significance level of <0.05 will be used for all analyses, and it will be considered statistically significant.

### 3. RESULTS

Overall, 367 students from the Makkah region's high schools and Umm Al-Qura University colleges were surveyed. Students with less than 20-years old predominantly represented 60.8%, compared with students with 20-years old or more 39.2%. In addition, most respondents were female, showing 50.7% of responses, while males represented 49.3%. Furthermore, most students were Saudis 88.0%. Single respondents showed predominant representation in comparison to married participants. Mostly, the high schools students were the majority representing 58.6%, while university students were 41.4% (Table 1). There were 18-subcategories questions that aimed to estimate students' level of knowledge were labeled in (Table 1). The questions of preventive measurements of both "hand and eye hygiene" and "discard the contact lenses when conjunctivitis symptoms occurs" showed more than 50% as good correct responses among students (61.3%, 52.9%, respectively). The majority of participants were not aware about conjunctivitis term 60.76%, compared with those aware of it 39.24% (Figure 1).

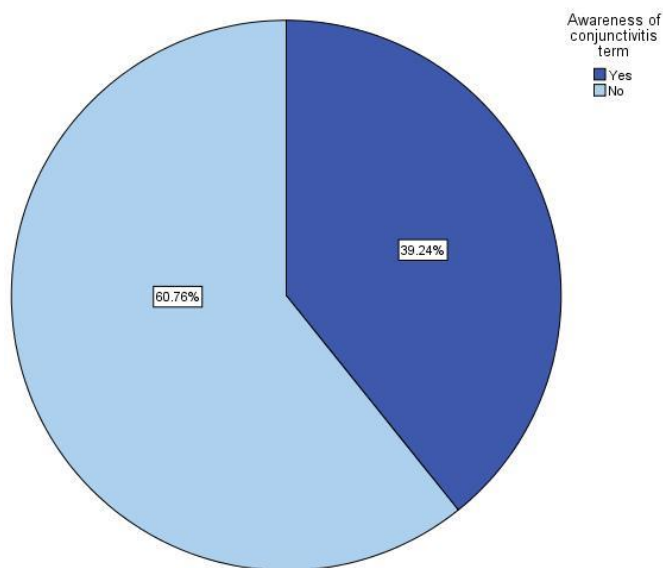
**Table 1** Demographic data

Variable	Category	Frequency (n.)	(%)
Age groups	Less than 20	223	60.8
	20 or more	144	39.2
Gender	Male	181	49.3
	Female	186	50.7
Nationality	Saudi	323	88.0
	Non-Saudi	44	12.0
Marital status	Single	351	95.6
	Married	16	4.4
Educational-level	School	215	58.6
	University	152	41.4
Percentage of the correct response of the students			Correct responds (%)
Conjunctivitis mainly affect eye.			37.1
Pink eye another common name of conjunctivitis?			26.7
Conjunctivitis is transmissible			21.3
Viral conjunctivitis symptoms			47.7
Bacterial conjunctivitis symptoms			38.1
Conjunctivitis causes			40.3
Contact lenses has possible to cause conjunctivitis			39.8
Shearing of contact lens ,eye makeup, towel or eye drop can leads to conjunctivitis			40.3
Mild conjunctivitis diagnoses workup			39.2
Eye swab and culture can be used for conjunctivitis evaluation			30.8
Slit lamp(bio microscopy)examination for diagnoses workup			23.2
Conjunctivitis preventive measurements			61.3
Discard the lens that you were using when symptoms of conjunctivitis appeared			52.9
Conjunctivitis is self-limiting condition			14.7
Wash cloth soak in a warm water and put on eye for few mint 3-4 time in a day provide relief			46.3
Artificial tear provide relief for conjunctivitis			22.3
Treatment of bacterial conjunctivitis			38.1
Complications of conjunctivitis			32.7

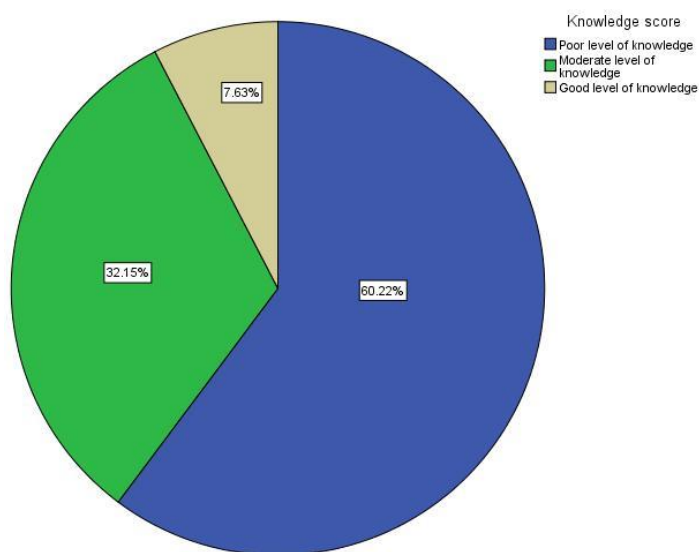
Consistently, the university students correspond significantly with awareness level of conjunctivitis term (P-value, 0.000) (Table 2). Additionally, most of students correspond with poor level of knowledge, followed moderate level of knowledge (60.22%, 32.15%, respectively) (Figure 2).

**Table 2** The correlation between awareness level of conjunctivitis term with students' educational level

Category (Educational-level)	Awareness level of conjunctivitis term		P-value
	Yes (%)	No (%)	
High school students	17.2	82.8	0.000*
University students	70.4	29.6	



**Figure 1** Pie chart for awareness of conjunctivitis term among students.



**Figure 2** Students' knowledge score

The correlation between students' age, gender, and educational level with questions categories was demonstrated in (Table 3). Students aging two decades (20 years) or more correspond significantly with both of "general conjunctivitis characteristics", "causes and risk factors", and "diagnosis workup" questions categories (P-value, 0.000). However, students much less than two

decades old corresponded significantly with both “sign and symptoms” and “managements and prevention methods” questions categories (P-value, 0.000). Moreover, male respondents were significantly associated with “general conjunctivitis characteristics” and “causes and risk factors” questions categories (P-value, 0.005, 0.027, respectively) (Table 3).

Surprisingly, educational levels were related significantly with questions categories (P-value, 0.000); university students showed more significant levels than high school students with classes of both “general conjunctivitis characteristics”, “causes and risk factors”, and “diagnosis workup”. In contrast, high school students correspond higher than university students with the “managements and prevention methods” category. Moreover, high school and university students corresponded equally with the “sign and symptoms” category (Table 3).

**Table 3** The correlation between students' age, gender, and educational level with correct answers responds

Categories		Age		P-value	Gender		P-value	Educational-level		P-value
		Less than 20	20 or more		Male	Female		School	University level	
General characteristics	Correct responses (%)	43.5%	56.5%	0.000*	54.3%	45.7%	0.005*	40.9%	59.1%	0.000*
Causes and risk factors		47.8%	52.2%	0.000*	53.7%	46.3%	0.027*	44.3%	55.7%	0.000*
Sign and symptoms		51.0%	49.0%	0.000*	47.1%	52.9%	0.649	50.0%	50.0%	0.000*
Diagnosis workup		49.7%	50.3%	0.000*	48.2%	51.8%	0.365	47.2%	52.8%	0.000*
Managements and prevention methods		52.9%	47.1%	0.000*	49.4%	50.6%	0.134	51.0%	49.0%	0.000*

Both age groups and educational levels correspond significantly with the level of knowledge among students (P-value, 0.000); students with 20 or more correspond with a good level of knowledge higher than high school students. Whereas; university students also demonstrate a greater level significance than high school students (Table 4) conversely, students' gender, nationalities, and marital status showed no significant differences with the level of knowledge (P-value, 0.238, 0.813, 0.889, respectively).

**Table 4** The correlation between level of knowledge and students' demography

Variable	Level of knowledge			P-value
	Good (%)	Moderate (%)	Poor (%)	
Age				
Less than 20	3.6%	25.6%	70.9%	0.000*
20 or more	13.9%	42.4%	43.8%	
Gender				
Male	9.9%	30.4%	59.7%	0.238
Female	5.4%	33.9%	60.8%	
Nationality				
Saudi	7.7%	31.6%	60.7%	0.813
Non-Saudi	6.8%	36.4%	56.8%	
Marital status				
Single	7.7%	31.9%	60.4%	0.889
Married	6.3%	37.5%	56.3%	
Educational-level				
School	3.7%	23.7%	72.6%	0.000*
University	13.2%	44.1%	42.8%	

#### 4. DISCUSSION

Conjunctivitis is a contagious eye infection (Tuladhar & Gurung, 2020). However, it happens throughout the year (Tuladhar & Gurung, 2020). More cases are reported in our country during the summer and rainy seasons (Tuladhar & Gurung, 2020). Infectious conjunctivitis is profoundly infectious and spreads quickly in schools and at home (Tuladhar & Gurung, 2020). This study found that 39.24 % of the participants were aware of conjunctivitis in general. In comparison, a survey conducted in the University of Balochistan found that 100% of their samples have heard about conjunctivitis terms (Khan et al., 2018). Among all our participants, 37.1 % were aware that it mainly affects the eyes compared to 97.6% of Balochistan University (Khan et al., 2018). While 26.7 % of our sample found to know the pink eye concept, on the contrary, Balochistan students answers with 56.2% to the same question correctly (Khan et al., 2018). In addition, 41.8 % of them had awareness about the spread pattern compared to 21.3% in our sample (Khan et al., 2018). Regarding symptomology, our sample awareness towards bacterial and viral infection was 38.1% and 47.7% respectively which demarcate a small percentage in comparison to 75.3% of Balochistan students' responses were 72.1 % and 80.9% about the same question (Khan et al., 2018).

When we assessed the causative agents, 40.3% of the participants answered correctly about Irritant material as a cause, and 39.8% answered correctly about the potentiality of contact lenses to cause conjunctivitis. While Balochistan student's, answered correctly with (53.8% and 39.0%) respectively (Khan et al., 2018). When we assessed their knowledge about the diagnosis modalities, 39.2% knew that mild conjunctivitis was diagnosed through signs and symptoms. This study found that 30.8% answered about sampling methods correctly for further evaluation. Whereas 23.2% were aware of slit lamp value in diagnosing with a similar response in Balochistan students (Khan et al., 2018).

When we assessed the prevention and remedy questions, 61.3 % of our sample knew that hand hygiene could prevent conjunctivitis. The majority assembled and answered correctly 52.9 % that discarding the lens you were using when symptoms of conjunctivitis appeared would be a preventive measure. 14.7% of our students answered that conjunctivitis is a self-limiting disease, compared to Balochistan students with a majority of 49.8% who don't know while 16.7% answer correctly (Khan et al., 2018). Therefore, in comparison to Balochistan students, our sample had less conjunctivitis awareness based on the responses answered. Additionally, it is also important to mention our sample was a high school student and university student (Khan et al., 2018). While Balochistan University conducted the study on a college student, 49% were health science, faculty students (Khan et al., 2018).

Our study showed that 32.15% of our participants had moderate knowledge, but only 7.63% had good knowledge regarding conjunctivitis, while in a study performed in Pakistan (Khan et al., 2018), 51% had adequate knowledge. Another research was conducted in Tabuk, Saudi Arabia (Alhemaiddi et al., 2017) showed that 72.9% of participants had good knowledge. The difference in knowledge level is taken into consideration. We targeted the general population of two different educational stages vary in ages and information outcomes, and not limited only to health since colleges, unlike both studies (Khan et al., 2018; Alhemaiddi et al., 2017).

Our study demonstrated a difference in educational level related to conjunctivitis awareness level. It showed only 17.2% of high school students have heard of conjunctivitis term compared to 70.4% of university students. However, a study performed in Western Nepal (Tuladhar & Gurung, 2020) showed that 61.6% of secondary school students have heard about conjunctivitis. Another study in Africa (Bodunde et al., 2016) demonstrated that 81% of their senior secondary school students have heard about conjunctivitis.

The presents study demonstrated a significant association between the majority of correct responding and university students. This is in concordance with another study, which found that graduated students correspond significantly with conjunctivitis symptoms (p-value 0.0001) (Zarea, 2016) whereas; most second-year medical students had a good level of knowledge in recognizing conjunctivitis symptoms (0.0024) (Alhemaiddi et al., 2017). Surprisingly, the previous studies (Zarea, 2016; Alhemaiddi et al., 2017) addressed that students in closely similar age groups with various educational level corresponds significantly with conjunctivitis symptoms.

#### Limitations

This study may address some possible limitations in general representative responses among all Saudi universities. Accordingly, to achieve an accurate level of knowledge, this study needs further investigations.



## 5. CONCLUSION

Our outcome suggests a poor level of understanding about conjunctivitis among the majority of students. Therefore, proper educational campaigns and awareness programs need to be addressed to maximize students' knowledge in conjunctivitis prevention.

### Acknowledgement

We thank the participants who were all contributed samples to the study.

### Ethical approval

The study was approved by the Medical Ethics Committee of Umm Al-Qura University (ethical approval code: HAPO-02-K-012-2021-11-820).

### Funding

This study has not received any external funding.

### Conflicts of interest

The authors declare that there are no conflicts of interests.

### Data and materials availability

All data associated with this study are present in the paper.

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